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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/619,647 Confirmation No.: 1264
Applicant(s): Harper, Jr.
Filed: 7/14/2003
Art Unit: 2833
Examiner: Gushi, Ross N.
Title: Electrical Contact Assembly With Insulative Carrier,
Stapled Contact Attachment and Fusible Element

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Commissioner For Patents
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Appeal Brief

Sir:

This is an appeal brief in regard to the final rejection of claims in the above-identified patent application. A Notice of Appeal was mailed to the USPTO on 9/1/2004. The fee under 37 C.F.R. §41.20(b)(2) is enclosed. Please charge deposit account 50-1924 for any fee deficiency.

I. Real Party In Interest

The real party in interest is FCI Americas Technology, Inc.

II. Related Appeals and Interferences

There are no directly related appeals or interferences regarding this application.

III. Status Of Claims

Claims 1-22 are pending in this application. Claims 1-22 have been rejected by the Examiner. The rejection of Claims 1-22 is appealed.

IV. Status Of Amendments

Since the final rejection of 06/29/2004 one amendment was filed on August 31, 2004. The amendment was entered.

V. Summary of Claimed Subject Matter

Independent claim 1 is for an electrical connector (10) comprising a contact terminal (18) and a fusible element (20) (page 6, lines 18-22). The contact (18) has two cantilevered, deflectable contact arms (46, 48) (page 9, lines 10-12). The fusible element is attached to an end of a first one of the contact arms (46) (page 10, last two lines). The fusible element (20) can be fused to a first electronic component (12) and both arms (46, 48) can deflect (page 11, line 28 - page 12, line 6) (page 12, lines 6-11 and lines 18-27).

Independent claim 13 is for an electrical connector subassembly (17) comprising a carrier (19) and a plurality of electrical contact terminals (18) (page 6, lines 20-22). The contacts (18) have tabs (60) which extend through the carrier (19) to form a stapled connection of the contacts (18) with the carrier (19) (page 10, lines 10-14).

Independent claim 21 is directed to a method of assembling an electrical contact assembly (17) by providing a contact terminal (18) with two cantilevered deflectable contacts arms (46, 48) and attaching a fusible element to an end of a first one of the deflectable arms (46) (page 9, lines 10-12, and page 10, last two lines).

VI. Grounds of Rejection to be Reviewed on Appeal

- A. Claims 3 and 15 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- B. Claims 1-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Harper, Jr. et al. (US 6,375,474 B1) in view of Lin et al. (US 6,217,348 B1).
- C. Claims 1 and 9-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Grabbe (US 5,228,861) in view of Lin et al. (US 6,217,348 B1).
- D. Claims 9-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Grabbe (US 5,228,861) in view of Lin et al. (US 6,217,348 B1) and Roder et al (US 5,860,831).
- E. Claims 9, 10 and 13-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Harper, Jr. et al. (US 6,375,474 B1) in view of Lin et al. (US 6,217,348 B1), Grabbe (US 5,228,861) and Roder et al (US 5,860,831).

VII. Argument

A. Claims 3 and 15 under 35 U.S.C. §112, second paragraph

The examiner has stated that the meaning of the term "a compound curvature" in claims 3 and 15 is unclear and confusing in light of the specification and drawings. The examiner stated that applicant gives no description of how applicant's contact arm comprises a compound curvature and applicant's figures do not clearly show any compound curvature in the curved top surface 58.

The term "compound curvature" would be understood by a person skilled in the art. Paragraph 0028 uses the term. Fig. 2 shows one curvature at 18 and Fig. 3 shows the second curvature at 48 which combine to form the compound curvature at the contact area of the second contact arm. For example, after receiving the office action, applicant's attorney performed a search on the USPTO web site for patents having the terms: "compound curvature" and "contact" and "electrical connector". There were 16 patents. A search just on the term "compound curvature" resulted in 751 patents. The term is neither vague nor indefinite, and would be understood by a person skilled in the art. Therefore, the Board is requested to reverse the examiner's rejection.

B. 35 U.S.C. §103(a); Harper, Jr. et al. (US 6,375,474 B1) in view of Lin et al. (US 6,217,348 B1).

Claim 1

Claim 1 claims a fusible element fixedly attached to an end of the **cantilevered deflectable** first contact arm, and that the first and second contact arms are **adapted to deflect** when the contact area of the second contact arm is contacted by the second pad of the second electronic component.

Harper, Jr. et al. does not disclose or suggest a fusible element. Harper Jr. et al. merely discloses wiping type of contact areas. Harper, Jr. et al. has deflectable contact arms 15, 17 and 115, 117, but they have contact areas 118, 120 for contact wipe (see Fig. 6a, column 4, lines 4-8). Harper, Jr. et al. teaches the use of only a wiping action of the contacts against the pads of the mating electrical pads. There is no disclosure or suggestion of using a fusible element on a deflectable contact arm which is **intended for wiping action during deflection**. The examiner has stated:

"Regarding Harper and Grabbe, the examiner agrees that the Harper and Grabbe contact arms allowing wiping when the contacts are not permanently attached to the underlying substrate. The wiping action is desirable when connection are repeatedly made and broken."

The examiner goes on to state that sometimes it is desirable to permanently attach a contact to a substrate and that soldering the contact creates a secure electrically stable attachment. The examiner concludes that it would have been obvious to permanently attach the Grabbe or Harper contacts using well know techniques such as disclosed in Lin. However, the examiner has failed to take into account the knowledge of

a person skilled in the art that movement of a contact at a solder joint is not desired because of risk that the soldered connection will be damaged.

Lin et al. discloses a fusible element (2). In the past, fusible elements were attached to stationary portions of contacts, such as shown in Lin et al. Lin et al. does not disclose or suggest mounting the fusible element (2) to a **movable, deflectable portion of the contact**. Lin et al. only discloses attaching the fusible element (2) to a **stationary tail 13 or a stationary arcuate receiving section 53**.

A person skilled in the art would normally not put a fusible element (solder ball) on the end of a movable section of a contact because there is an obvious risk that the soldered connection would be damaged when the movable section deflects. However, applicant has discovered that this risk is minimal in a small size connector, such as a connector used to connect a microprocessor to a printed circuit board (see Fig. 1). Because it would not have been obvious for a person skilled in the art to put a fusible element (solder ball) on the end of a movable section of a contact (because there is an obvious risk that the soldered connection would be damaged when the movable section deflects), it would not be obvious to add the solder ball (2) of Lin et al. to a movable section of the contact in Harper, Jr. et al.

Applicant has found that by mounting the fusible element to a deflectable portion of the contact, and by using both contact arms (46, 48) for deflection, the connector can be smaller than previously provided, but still provide adequate deflection and contact force of the contact for good wiping of

the second contact arm (48) against the second pad (see paragraphs 0004-0005 and last sentence of paragraph 0035 of the application). As noted in paragraph 0034, when the fusible element is melted, the contact arms 46 of the many contacts 18 will deflect outward different amounts due to different sizes of the solder balls 20 before melting, such as due to tolerance variations of the solder balls, and different sizes and shapes of the contact arms 46 due to tolerance variations. As noted in paragraph 0035, the clamping structure which presses the second component 14 towards the first component 12 causes both the arms 46, 48 (including the arm 46 having the fusible element attached to the pad 23 of the first electronic component 12) to deflect in generally opposite directions towards the base 44. This structure increases the height of available deflection by using area both above and below the base 44 and, increases the normal force against the pads 22 of the second electronic component 14 because of the use of both arms 46, 48 to deflect.

There is no suggestion, express or implied, to use the fusible element of Lin et al. on one of the contact arms of Harper, Jr. et al. Lin et al. merely discloses use of the fusible element (2) on a stationary portion of a contact; not on a movable portion of a contact. This suggestion only arises after reading the present patent application. This is in addition to the fact that Harper, Jr. et al. only discloses wiping contact with both contact areas 118, 120 of the contact arms 15, 17 for contact wipe (see Fig. 6a, column 4, lines 4-8). Therefore, claim 1 is patentable and should be allowed.

Claims 2, 4, 5 and 8 stand or fall with claim 1.

Claim 3

Claim 3 claims that the surface contact area on the second contact arm comprises a compound curvature. This feature, in combination with the features recited in claim 1, is not disclosed or suggested in the art of record.

Claim 6

Claim 6 claims that the end of the first contact arm comprises a concave bottom surface, and wherein a top surface of the fusible element is attached to the end of the first contact arm against the concave bottom surface. Lin et al. discloses an arcuate receiving section (53) which receives the solder ball (2). However, the concave bottom surface recited in claim 6 is on a cantilevered and deflectable contact arm. The arcuate receiving section (53) in Lin et al. is not on a cantilevered and deflectable contact arm. There is no disclosure or suggestion of adding Lin's arcuate receiving section (53) to Harper's contact areas 118, 120 which are designed for wiping contact. The features of claim 6 are not disclosed or suggested in the art of record.

Claim 7

Claim 7 claims that a top surface of the fusible element is attached to a bottom surface of the end of the first contact arm. Harper, Jr. et al. merely discloses that it's contact areas 118, 120 are for wiping contact. There is no disclosure or suggestion of a top surface of a fusible element being attached to a bottom surface of the end of one of the contact arm 15, 17. In regard to Lin et al., as noted above, a person skilled in the art would normally not put a fusible element

(solder ball) on the end of a movable section of a contact because there is an obvious risk that the soldered connection would be damaged when the movable section deflects. However, applicant has discovered that this risk is minimal in a small size connector, such as a connector used to connect a microprocessor to a printed circuit board (see Fig. 1). Because it would not have been obvious for a person skilled in the art to put a fusible element (solder ball) on the end of a movable section of a contact (because there is an obvious risk that the soldered connection would be damaged when the movable section deflects), it would not be obvious to add the solder ball (2) of Lin et al. to a movable section of the contact in Harper, Jr. et al.

C. 35 U.S.C. §103(a); Grabbe (US 5,228,861) in view of Lin et al. (US 6,217,348 B1).

Claim 1

As noted above, claim 1 claims a fusible element fixedly attached to an end of the cantilevered deflectable first contact arm, and that the first and second contact arms are adapted to deflect when the contact area of the second contact arm is contacted by the second pad of the second electronic component.

Grabbe has contact tips 30, 34 to effect a wipe of the pads by the contact tips. As noted by Grabbe at column 5, lines 21-28:

"This wiping action has been demonstrated repeatedly to provide a superior electrical interface, wiping films and

oxidation products, debris, insulation and dust particles and smearing over microscopic plating holes to assure a low resistance, stable electrical interface between contact and pad."

Grabbe teaches the use of only wiping action of the contacts against the pads of the mating electrical pads. There is no disclosure or suggestion of using a fusible element on a deflectable contact arm which is intended for wiping action during deflection. The examiner has stated that:

"Regarding Harper and Grabbe, the examiner agrees that the Harper and Grabbe contact arms allowing wiping when the contacts are not permanently attached to the underlying substrate. The wiping action is desirable when connection are repeatedly made and broken."

Lin et al. discloses a fusible element (2). In the past, fusible elements were attached to stationary portions of contacts, such as shown in Lin et al. Lin et al. does not disclose or suggest mounting the fusible element (2) to a movable, deflectable portion of the contact. Lin et al. only discloses attaching the fusible element (2) to a stationary tail 13 or a stationary arcuate receiving section 53.

Applicant has found that by mounting the fusible element to a deflectable portion of the contact, and by using both contact arms for deflection, the connector can be smaller than previously provided, but still provide adequate deflection and contact force of the contact for good wiping of the second contact arm (48) against the second pad (see paragraphs 0004-0005 and last sentence of paragraph 0035 of the application).

As noted in paragraph 0034, when the fusible element is melted, the contact arms 46 of the many contacts 18 will deflect outward different amounts due to different sizes of the solder balls 20 before melting, such as due to tolerance variations of the solder balls, and different sizes and shapes of the contact arms 46 due to tolerance variations. As noted in paragraph 0035, the clamping structure which presses the second component 14 towards the first component 12 causes both the arms 46, 48 (including the arm 46 having the fusible element attached to the pad 23 of the first electronic component 12) to deflect in generally opposite directions towards the base 44. This structure increases the height of available deflection by using area both above and below the base 44 and, increases the normal force against the pads 22 of the second electronic component 14 because of the use of both arms 46, 48 to deflect.

There is no suggestion, express or implied, to use the fusible element of Lin et al. on one of the deflectable contact arms of Grabbe. This suggestion only arises after reading the present patent application. Therefore, claim 1 is patentable and should be allowed.

Claim 9

Claim 9 is dependent upon claim 1. In addition to the features of claim 1, claim 9 claims a carrier comprising electrically insulative material, wherein the base of the contact terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a **stapled connection** of the base with the carrier.

Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section. The examiner has stated "...to the extent that it is **arguably ambiguous** whether the Grabbe tabs extend back toward the main body, Roder discloses tabs 30, 31, which extend back towards the body." Thus, it appears that the examiner agrees that Grabbe does not disclose that its tabs 22' extend back towards its main body. The features of claim 9 are not disclosed or suggested in Grabbe in view of Lin et al. Therefore, claim 9 is patentable and should be allowed. The effect of Roder et al. is discussed below under Section D.

Claims 10-12 stand or fall with claim 12.

Claim 13

Claim 13 claims an electrical connector subassembly comprising a carrier and electrical contact terminals. Claim 13 claims that the base of each terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a **stapled connection** of the base with the carrier. Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section. Lin et

al. does nothing to help the disclosure/suggestion deficiency of Grabbe. The examiner has stated "...to the extent that it is **arguably ambiguous** whether the Grabbe tabs extend back toward the main body, Roder discloses tabs 30, 31, which extend back towards the body." It appears that the examiner agrees that Grabbe does not disclose that its tabs 22' extend back towards its main body. The features of claim 13 are not disclosed or suggested in the art of record. Therefore, claim 13 is patentable and should be allowed. The effect of Roder et al. is discussed below under Section D.

Claim 14 stands or falls with claim 13.

Claim 15

Claim 15 claims that the surface contact area on the second contact arm comprises a compound curvature. Nowhere in Grabbe or Lin et al. is there a disclosure or suggestion of a contact arm with a compound curvature as recited in claim 15. Therefore, claim 15 is patentable and should be allowed.

D. 35 U.S.C. §103(a); Grabbe (US 5,228,861) in view of Lin et al. (US 6,217,348 B1) and Roder et al (US 5,860,831).

Claim 9

Claim 9 is dependent upon claim 1. In addition to the features of claim 1, claim 9 claims a carrier comprising electrically insulative material, wherein the base of the contact terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a **stapled connection** of the base with the carrier.

Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section.

The examiner has stated "...to the extent that it is **arguably ambiguous** whether the Grabbe tabs extend back toward the main body, Roder discloses tabs 30, 31, which extend back towards the body." It appears that the examiner agrees that Grabbe does not disclose that its tabs 22' extend back towards its main body. Roder et al. discloses a flat/round cable connecting device 16. The device has four tongues 30, 32 which are pushed through a flat conductor 24 and crimped to make an electrical connection with the conductor 24. The device 16 electrically connects the conductors 24 to the round conductors 12. However, there appears to be no suggestion to apply the teaching of Roder et al. to Grabbe. Roder et al. is directed to a device 16 for electrically connecting two conductors 12, 24 to each other; each being a different type of conductor. Why would a person skilled in the art modify tabs 22' of Grabbe because of Roder et al.? The suggestion to modify Grabbe only comes after reading the present patent application.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves

or in the knowledge generally available to one of ordinary skill in the art. (see MPEP 2143.01, page 2100-98, column 1). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination (see MPEP 2143.01, page 2100-98, column 2). A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention are individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. (see MPEP 2143.01, page 2100-99, column 1) *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). >See also *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.)

The examiner's statement that it would have been obvious that the crimping of Grabbe's tabs 22' could naturally result in the tabs extending back towards the body as shown in Roder, and that such a structure would have been an obvious, if not natural, consequence of the crimping die and would have been desirable to best secure the contact to the substrate, appears based on hindsight; not being taught or suggested in the art of record. There appears to be no disclosure or suggestion of using the electrical crimp connection of Roder et al. and the non-electrical connection in Grabbe to connect the contact 20" to the dielectric member 12". The features of claim 9 are not

disclosed or suggested in the cited art. Therefore, claim 9 is patentable and should be allowed.

Claims 10-12 stand or fall with claim 9.

Claim 13

Claim 13 claims that the base of each terminal comprises tabs which extend through the carrier and are deformed with the tabs extending **back towards a main section of the base to form a stapled connection** of the base with the carrier. Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section.

The examiner has stated "...to the extent that it is **arguably ambiguous** whether the Grabbe tabs extend back toward the main body, Roder discloses tabs 30, 31, which extend back towards the body." It appears that the examiner agrees that Grabbe does not disclose that its tabs 22' extend back towards its main body. Roder et al. discloses a flat/round cable connecting device 16. The device has four tongues 30, 32 which are pushed through a flat conductor 24 and crimped to make an electrical connection with the conductor 24. The device 16 electrically connects the conductors 24 to the round conductors 12. However, there appears to be no suggestion to apply the teaching of Roder et al. to Grabbe. Roder et al. is directed to a device 16 for electrically connecting two conductors 12, 24 to each other; each being a different type

of conductor. Why would a person skilled in the art modify tabs 22' of Grabbe because of Roder et al.? Any suggestion to modify Grabbe only comes after reading the present patent application. The features of claim 13 are not disclosed or suggested in the art of record. Therefore, claim 13 is patentable and should be allowed.

Claim 14 stands or falls with claim 13.

Claim 15

Claim 15 claims that the surface contact area on the second contact arm comprises a compound curvature. Nowhere in Grabbe or Lin et al. is there a disclosure or suggestion of a contact arm with a compound curvature as recited in claim 15. Therefore, claim 15 is patentable and should be allowed.

E. 35 U.S.C. §103(a); Harper, Jr. et al. (US 6,375,474 B1) in view of Lin et al. (US 6,217,348 B1), Grabbe (US 5,228,861) and Roder et al (US 5,860,831).

Claim 9

Claim 9 is dependent upon claim 1. In addition to the features of claim 1, claim 9 claims a carrier comprising electrically insulative material, wherein the base of the contact terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a **stapled connection** of the base with the carrier.

Harper, Jr. et al. discloses contacts 13 mounted on pegs 29.

Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section. The examiner has stated "...to the extent that it is **arguably ambiguous** whether the Grabbe tabs extend back toward the main body, Roder discloses tabs 30, 31, which extend back towards the body."

Roder et al. discloses a flat/round cable connecting device 16. The device has four tongues 30, 32 which are pushed through a flat conductor 24 and crimped to make an electrical connection with the conductor 24. The device 16 electrically connects the conductors 24 to the round conductors 12. However, there appears to be no suggestion to apply the teaching of Roder et al. to Harper, Jr. et al. Roder et al. is directed to a device 16 for electrically connecting two conductors 12, 24 to each other; each being a different type of conductor. Why would a person skilled in the art modify tabs 22' of Harper, Jr. et al. and/or Grabbe because of Roder et al.? The suggestion to modify Harper, Jr. et al. only comes after reading the present patent application. The features of claim 9 are not disclosed or suggested in the art of record. Therefore, claim 9 is patentable and should be allowed.

Claim 10 stands or falls with claim 9.

Claim 13

Claim 13 claims an electrical connector subassembly comprising a carrier and electrical contact terminals. Claim 13 claims that the base of each terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a stapled connection of the base with the carrier. Fig. 12 of Grabbe shows two tabs 22' which extend through holes 15 and extend outwardly away from each other. However, there is no disclosure or suggestion of a stapled connection wherein the tabs 22' extend back towards a main section of the base after they pass through the holes 15. The tabs 22' are merely shown as extending outward; not back towards a main section.

Roder et al. discloses a flat/round cable connecting device 16. The device has four tongues 30, 32 which are pushed through a flat conductor 24 and crimped to make an electrical connection with the conductor 24. The device 16 electrically connects the conductors 24 to the round conductors 12. However, there appears to be no suggestion to apply the teaching of Roder et al. to Harper, Jr. et al. Roder et al. is directed to a device 16 for electrically connecting two conductors 12, 24 to each other; each being a different type of conductor. Why would a person skilled in the art modify tabs 22' of Harper, Jr. et al. and/or Grabbe because of Roder et al.? The suggestion to modify Harper, Jr. et al. only comes after reading the present patent application. The features of claim 13 are not disclosed or suggested in the art of record. Therefore, claim 13 is patentable and should be allowed.

Claims 14, 16 and 17 stand or falls with claim 13.

Claim 15

Claim 15 claims that the surface contact area on the second contact arm comprises a compound curvature. Nowhere in Grabbe or Lin et al. is there a disclosure or suggestion of a contact arm with a compound curvature as recited in claim 15. Therefore, claim 15 is patentable and should be allowed.

Claim 18

Claim 18 claims that the subassembly further comprises a fusible element fixedly attached to an end of a first one of the contact arms, wherein the end of the first contact arm comprises a concave bottom surface, and wherein a top surface of the fusible element is attached to the end of the first contact arm against the bottom concave surface. Lin et al. discloses a fusible element (2). In the past, fusible elements were attached to stationary portions of contacts, such as shown in Lin et al. Lin et al. does not disclose or suggest mounting the fusible element (2) to a movable, deflectable portion of the contact. Lin et al. only discloses attaching the fusible element (2) to a stationary tail 13 or a stationary arcuate receiving section 53.

There is no suggestion, express or implied to use the fusible element of Lin et al. on one of the contact arms of Harper, Jr. et al. Lin et al. merely discloses use of the fusible element (2) on a stationary portion of a contact; not on a movable portion of a contact. This suggestion only arises after reading the present patent application. A person skilled in the art would normally not put a fusible element (solder ball) on the end of a movable section of a contact

because there is an obvious risk that the soldered connection would be damaged when the movable section deflects. However, applicant has discovered that this risk is minimal in a small size connector, such as a connector used to connect a microprocessor to a printed circuit board (see Fig. 1). Because it would not have been obvious for a person skilled in the art to put a fusible element (solder ball) on the end of a movable section of a contact (because there is an obvious risk that the soldered connection would be damaged when the movable section deflects), it would not be obvious to add the solder ball (2) of Lin et al. to a movable section of the contact in Harper, Jr. et al. This is in addition to the fact that Harper, Jr. et al. only discloses wiping contact with both contact areas 118, 120 of the contact arms 15, 17 for contact wipe (see Fig. 6a, column 4, lines 4-8). Therefore, claim 18 is patentable and should be allowed.

Claim 19

Claim 19 claims that the subassembly further comprises a fusible element fixedly attached to an end of a first one of the contact arms, wherein a top surface of the fusible element is attached to a bottom surface of the end of the first contact arm. The features recited in claim 19 are not disclosed or suggested in the cited art.

Claim 20

Claim 20 claims that the subassembly further comprises a fusible element fixedly attached to an end of a first one of the contact arms, wherein the end of the first contact arm

extends into the fusible element. The features recited in claim 20 are not disclosed or suggested in the cited art.

Claim 21

Claim 21 is a method claim. Claim 21 claims attaching a fusible element to an end of the cantilevered deflectable second contact arm, wherein the first and second contact arms are adapted to deflect in opposite directions towards the base when the contact assembly is compressed between two electronic components. As noted above with respect to claim 1, in the past, fusible elements were attached to stationary portions of contacts as shown in Lin et al. However, Lin et al. does not disclose or suggest mounting the fusible element to a movable, deflectable portion of the contact.

Applicant has found that by mounting the fusible element to a deflectable portion of the contact, and by using both contact arms for deflection, the connector can be smaller than previously provided, but still provide adequate deflection and contact force of the contact for good wiping of the second contact arm against the second pad (see paragraphs 0004-0005 and last sentence of paragraph 0035 of the application).

Harper, Jr. et al. has deflectable contact arms 15, 17 and 115, 117, but they have contact areas 118, 120 for **contact wipe** (see Fig. 6a, column 4, lines 4-8). Harper, Jr. et al. teaches the use of only wiping action of the contacts against the pads of the mating electrical pads. There is no disclosure or suggestion of using a fusible element on a deflectable contact arm which is intended for wiping action during deflection. There is no suggestion, express or

implied, to use the fusible element of Lin et al. on one of the contact arms of Harper, Jr. et al.. This suggestion only arises after reading the present patent application. Roder et al. does nothing to correct the disclosure/suggestion deficiencies of Harper, Jr. et al., Grabbe and Lin et al. The cited art does not disclose or suggest contact arms adapted to deflect in opposite directions towards the base when the contact assembly is compressed between two electronic components, wherein one of the contact arms has a fusible element on its end. Therefore, claim 21 is patentable and should be allowed.

Claim 22

Claim 22 claims attaching the base of the contact terminal to a carrier comprised of insulative material, the step of attaching comprising extending tabs on the base through the carrier and deforming the tabs back towards a main section of the base to form a stapled connection of the base to the carrier. As noted above with respect to claims 9 and 13, Harper, Jr. et al. discloses contacts 13 mounted on pegs 29. Roder et al. discloses a flat/round cable connecting device 16. The device has four tongues 30, 32 which are pushed through a flat conductor 24 and crimped to make an electrical connection with the conductor 24. The device 16 electrically connects the conductors 24 to the round conductors 12. However, there appears to be no suggestion to apply the teaching of Roder et al. to Harper, Jr. et al. Roder et al. is directed to a device 16 for electrically connecting two conductors 12, 24 to each other; each being a different type of conductor. Why would a person skilled in the art modify

tabs 22' of Harper, Jr. et al. and/or Grabbe because of Roder et al.? The suggestion to modify Harper, Jr. et al. only comes after reading the present patent application. The features of claim 22 are not disclosed or suggested in the art of record. Therefore, claim 22 is patentable and should be allowed.

Conclusion

In view of the arguments presented above, it is respectfully requested that the Examiner's rejections of Claims 1-22 be reversed.

Respectfully submitted,

Mark F. Harrington

Mark F. Harrington (Reg. No. 31,686)

9/16/04

Date

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail on the date shown below in an envelope addressed to: Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

9/16/2004

Date

Elaine F. Inman

Name of Person Making Deposit



1. An electrical contact assembly comprising:

a contact terminal comprising a base and two cantilevered deflectable contact arms extending from at least one lateral side of the base, a first one of the contact arms extending in a downward direction and a second one of the contact arms extending in an upward direction; and

a fusible element fixedly attached to an end of the first contact arm,

wherein the fusible element is adapted to be fused to a first pad on a first electronic component, wherein the second contact arm comprises a surface contact area for contacting a second pad on a second electronic component, and wherein the first and second contact arms are adapted to deflect when the contact area of the second contact arm is contacted by the second pad of the second electronic component.

2. An electrical contact assembly as in claim 1 wherein the contact terminal comprises stamped sheet metal.

3. An electrical contact assembly as in claim 1 wherein the surface contact area on the second contact arm comprises a compound curvature.

4. An electrical contact assembly as in claim 1 wherein the first and second contact arms extend from a same lateral side of the base.

5. An electrical contact assembly as in claim 4 wherein the first and second contact arms extend in opposite directions generally parallel to each other.
6. An electrical contact assembly as in claim 1 wherein the end of the first contact arm comprises a concave bottom surface, and wherein a top surface of the fusible element is attached to the end of the first contact arm against the bottom concave surface.
7. An electrical contact assembly as in claim 1 wherein a top surface of the fusible element is attached to a bottom surface of the end of the first contact arm.
8. An electrical contact assembly as in claim 1 wherein the end of the first contact arm extends into the fusible element.
9. An electrical connector subassembly comprising:
 - a carrier comprising electrically insulative material;
 - an electrical contact assembly as in claim 1 connected to the carrier,
 - wherein the carrier comprises an aperture, wherein at least a portion of one of the contact arms extends through the aperture, and wherein the base comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a stapled connection of the base with the carrier.
10. An electrical connector subassembly as in claim 9 wherein the carrier comprises a sheet of electrically insulative

material, wherein the sheet comprises a plurality of the apertures, and wherein the subassembly comprises a plurality of the electrical contacts connected to the sheet in an array of multiple rows and columns.

11. An electrical connector subassembly as in claim 9 wherein the carrier comprises a film having a general sheet shape.

12. An electrical connector subassembly as in claim 11 wherein the film is flexible.

13. An electrical connector subassembly comprising:

a carrier comprising electrically insulative material;
and

a plurality of electrical contact terminals connected to the carrier, each terminal comprising a base and at least two deflectable contact arms extending from at least one lateral side of the base,

wherein the carrier comprises apertures, wherein at least one of the contact arms of each terminal extends through a respective one of the apertures, and wherein the base of each terminal comprises tabs which extend through the carrier and are deformed with the tabs extending back towards a main section of the base to form a stapled connection of the base with the carrier.

14. An electrical connector subassembly as in claim 13 wherein the contact terminals comprise stamped sheet metal.

15. An electrical connector subassembly as in claim 13 wherein a first one of the contact arms extending in a downward

direction and a second one of the contact arms extending in an upward direction, and wherein a surface contact area on the second contact arm comprises a compound curvature.

16. An electrical connector subassembly as in claim 13 wherein the contact arms extend from a same lateral side of the base.

17. An electrical connector subassembly as in claim 16 wherein the contact arms extend in opposite directions generally parallel to each other.

18. An electrical connector subassembly as in claim 13 further comprising a fusible element fixedly attached to an end of a first one of the contact arms, wherein the end of the first contact arm comprises a concave bottom surface, and wherein a top surface of the fusible element is attached to the end of the first contact arm against the bottom concave surface.

19. An electrical connector subassembly as in claim 13 further comprising a fusible element fixedly attached to an end of a first one of the contact arms, wherein a top surface of the fusible element is attached to a bottom surface of the end of the first contact arm.

20. An electrical connector subassembly as in claim 13 further comprising a fusible element fixedly attached to an end of a first one of the contact arms, wherein the end of the first contact arm extends into the fusible element.

21. A method of assembling an electrical contact assembly comprising steps of:

providing a contact terminal comprising a base and two cantilevered deflectable contact arms extending from a same lateral side of the base, a first one of the contact arms extending in an upward direction and a second one of the contact arms extending in a downward direction; and

attaching a fusible element to an end of the second contact arm, wherein the first and second contact arms are adapted to deflect in opposite directions towards the base when the contact assembly is compressed between two electronic components.

22. A method as in claim 21 further comprising attaching the base of the contact terminal and to a carrier comprised of insulative material, the step of attaching comprising extending tabs on the base through the carrier and deforming the tabs back towards a main section of the base to form a stapled connection of the base to the carrier.